EXHIBIT 4

Tutorial of Motorola Regarding
U.S. Patents 7,310,374, 7,310,375, and 7,310,376

Microsoft Corp. v. Motorola, Inc., et al.

Case No. C10-1823-JLR
(W.D. Wash.)

The '374, '375 and '376 Patents

U.S. Patent 7,310,374

U.S. Patent 7,310,375

U.S. Patent 7,310,376

* The specifications for each of these patents is identical.
Unless otherwise indicated, citations are to the '374 Patent.

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H.264 Standard

The present invention relates to encoding and decoding of digital video content. More specifically, the present invention relates to frame mode and field mode encoding of digital video content at a macroblock level as used in the MPEG-4 Part 10 AVC/H.264 standard video coding standard.

'374 Patent, 1:16-21

ITU-T
TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

H.264
(03/2010)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS
Infrastructure of audiovisual services – Coding of moving video

Advanced video coding for generic audiovisual services

Recommendation ITU-T H.264

Pictures Are Divided Into Units Called "Macroblocks"

FIG. 2

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A Macroblock Can Be Divided Into Smaller Sized Blocks

FIGS. 3a-f show that a macroblock can be further divided into smaller sized blocks. For example, as shown in FIGS. 3a-f, a macroblock can be further divided into block sizes of 16 by 8 pixels (FIG. 3a; 300), 8 by 16 pixels (FIG. 3b; 301), 8 by 8 pixels (FIG. 3c; 302), 8 by 4 pixels (FIG. 3d; 303), 4 by 8 pixels (FIG. 3e; 304), or 4 by 4 pixels (FIG. 3f; 305).

'374 Patent, 5:59-64

16 x 16

16 pixels

16 pixels

FIG. 3A   FIG. 3B   FIG. 3C   FIG. 3D   FIG. 3E   FIG. 3F

Index   SLIDE 4   FRAME 727

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'374 Patent, 5:59-64

16 x 8

16
pixels

8
pixels

300

16 PIXELS

8 PIXELS

FIG. 3A

301

16
PIXELS

8 PIXELS

FIG. 3B

302

8
PIXELS

8 PIXELS

FIG. 3C

303

4
PIXELS

8 PIXELS

FIG. 3D

304

8
PIXELS

4 PIXELS

FIG. 3E

305

4
PIXELS

4 PIXELS

FIG. 3F

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'374 Patent, 5:59-64

8 x 16

16 pixels

8 pixels

300
8 PIXELS
16 PIXELS
FIG. 3A

301
16 PIXELS
8 PIXELS
FIG. 3B

302
8 PIXELS
8 PIXELS
FIG. 3C

303
4 PIXELS
8 PIXELS
FIG. 3D

304
8 PIXELS
4 PIXELS
FIG. 3E

305
4 PIXELS
4 PIXELS
FIG. 3F

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'374 Patent, 5:59-64

8 x 8

FIG. 3A
FIG. 3B
FIG. 3C
FIG. 3D
FIG. 3E
FIG. 3F

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'374 Patent, 5:59-64

8 x 4

FIG. 3A

FIG. 3B

FIG. 3C

FIG. 3D

FIG. 3E

FIG. 3F

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'374 Patent, 5:59-64

4 x 8

FIG. 3A
FIG. 3B
FIG. 3C
FIG. 3D
FIG. 3E
FIG. 3F

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A Macroblock Can Be Divided Into Smaller Sized Blocks

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'374 Patent, 5:59-64

4 x 4

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A Macroblock contains Luma And Chroma Samples

Luma

Chroma

A Macroblock contains Luma And Chroma Samples

Luma

Chroma

Encoding

Video coding transforms the digital video content into a compressed form that can be stored using less space and transmitted using less bandwidth than uncompressed digital video content. It does so by taking advantage of temporal and spatial redundancies in the pictures of the video content.

'374 Patent, 2:1-5

Encoder

PREDICTION → TRANSFORM → QUANTIZATION → FREQUENCY COEFFICIENT SCAN → ENTROPY CODING

SLIDE 5   FRAME 75

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PREDICTION:
Eliminates redundancy from picture to picture

Image

Predictor

PREDICTION

Residual

Encoder

PREDICTION | TRANSFORM | QUANTIZATION | FREQUENCY COEFFICIENT SCAN | ENTROPY CODING

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SLIDE 5   FRAME 79

TRANSFORM:
Converts residual values to frequency coefficients

TRANSFORM

98	-1	-1	4
1	-2	-2	33
53	-2	28	3
2	1	1	2

Encoder

PREDICTION → TRANSFORM → QUANTIZATION → FREQUENCY COEFFICIENT SCAN → ENTROPY CODING

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QUANTIZATION:
Adjusts coding precision

FREQUENCY COEFFICIENT SCAN:
Scans from 2 dimensions to 1 dimension

Decoding

After the compressed video data has been transmitted, it must be decoded, or decompressed. In this process, the transmitted video data is processed to generate approximation data that is substituted into the video data to replace the "non-essential" data that was removed in the coding process.

'374 Patent, 1:62-67

Decoder

```
ENTROPY          INVERSE        DE-            INVERSE        INVERSE
DECODING   →     FREQUENCY  →   QUANTIZATION → TRANSFORM  →   PREDICTION
                 COEFFICIENT
                 SCAN
```

SLIDE 5   FRAME 200   Index

ENTROPY DECODING:
Expand the compressed bits

INVERSE FREQUENCY COEFFICIENT SCAN:
Scans from 1 dimension to 2 dimensions

DE-QUANTIZATION:
Rescales frequency coefficients to approximation of original values

INVERSE TRANSFORM:
Converts frequency coefficients to residual values

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INVERSE PREDICTION:
Restore pixel values from residual values

Residual

Predictor

INVERSE
PREDICTION

Image

Decoder

ENTROPY
DECODING

INVERSE
FREQUENCY
COEFFICIENT
SCAN

DE-
QUANTIZATION

INVERSE
TRANSFORM

INVERSE
PREDICTION

Index

FRAME
216

SLIDE
5

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Progressive Camera Captures Entire Frame Every 1/30 Of A Second

Progressive Camera Captures Entire Frame Every 1/30 Of A Second

A Progressive Camera captures each line of a Frame in succession.

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Lines From Top And Bottom Fields Can Be Merged To Form A Frame

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Coding Interlaced Video As Interlaced Frames Presented Problems

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